Anritsu

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or 1190

OPERATION MANUAL

GP-IB INTERFACE UNIT MD0620A

RS232C SERIAL INTERFACE UNIT MD0620

OPERATION MANUAL

GP-IB INTERFACE UNIT MD0620A

RS232C SERIAL INTERFACE UNIT MD0620B

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SECTION 1

GENERAL

The MD6401A Data Transmission Analyzer can be operated by remote control when it is equipped with a remote control unit (MD0620[ ]).

The MD6401A remote commands can be used in common with the remote control units shown below.

1. MD0620A: GP-IB interface unit
2. MD0620B: RS232C serial interface unit

This instruction manual describes the methods used in handling the MD6401A when it is connected with the GP-IB, RS232C, etc.

For functions and handling procedures of the MD6401A, refer to the MD6401A Data Transmission Analyzer Operation Manual.

1.1 GP-IB Interface (MD0620A)

By using the MD0620A GP-IB control unit, the MD6401A function as an IEEE-488 specification interface. Interfacing is achieved by using a converting connector (sold separately) with an IEC-IB of the IEC-625 Specification.

By connecting the MD6401A and a controller (normally, Packet IIe, PC8001 personal computer is used) with the bus cable, the following is possible:

1. The MD6401A can be remote-controlled by using the controller program.
2. Measured data can be transferred from the MD6401A to the controller.

The interface functions with respect to the MD6401A GP-IB are listed in Table 1-1.

Table 1-1 Interface Functions

Interface function	Classification	Description
Source handshake	SH1	Has SH function
Acceptor handshake	AH1	Has AH function
Talker	T6	Has basic talker and serial pole functions
Listener	L4	Has basic listener function
Service request	SR1	Has SR function
Remote and local	RL1	Has all RL functions
Parallel pole	PP0	Does not have PP function
Device clear	DC1	Has DC function
Device trigger	DT1	Has all DT functions
Controller	C0	Does not have C function

1.1.1 Connection method

(1) Setting the address switches

When the measuring device is connected to the GP-IB, it is necessary to allocate the natural No., which is called "address" to the device so that other measuring devices and/or printers (these are generally called "devices"), which are connected by the same bus cables are distinguishable.

The address switches which set the MD6401A addresses are set with the MD0620A GP-IB Interface Unit.

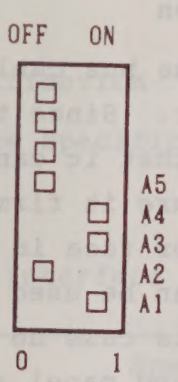


Fig. 1-1 Address Switches

The address is set by combining A1 to A5 switches. With these switches, the weight is determined as indicated in Table 1-2. For example, when the address is set to 13, the A4, A3 and A1 switches are set in column 1 so that 13 = 8 + 4 + 1, while A5 and A2 are set in column 0. (Refer to Fig. 1-1.)

Since switches other than A1 to A5 are not used, they can be either on or off.

Table 1-2 Setting of Address Switches

Bit names of switches	Column 1	Column 0
A1	1	0
A2	2	0
A3	4	0
A4	8	0
A5	16	0

(2) GP-IB connection

Connect the bus cable (solid separately) to the GP-IB connector. Since this cable is equipped with a lock screw so that it can be secured to the panel connector, secure it firmly. The male connector and female connector face in opposite directions and up to 5 connectors can be used one on top the other. However, in this case do not apply excessive force to the connector and panel surface.

Although the GP-IB system can be connected with up to 15 devices, there are two conditions:

1. A cable section should not exceed 2 m in length.
2. The overall length of a cable should not exceed 20 m.

Note: Operating errors may occur when there is much noise in the vicinity and when the cable is long.

1.2 RS232C Serial Interface Unit (MD0620B)

By using the MD0620B RS-232C Unit for remote control, the MD6401A can execute remote control by a serial signal from the EIA-RS232C or CCITT-V24 specification.

The MD6401A and controller (normally the Packet III or personal computer (PC8001, etc.) is used) are connected by a cable. Therefore,

1. The MD6401A is remote-controlled by using the controller program.
2. Measured data is transferred from the MD6401A to the controller.

1.2.1 Serial interface specification

(1) The serial interface specification of the MD0620B is shown in Table 1-3.

Table 1-3 Serial Interface Specifications

Item	Specifications
Transmission speed	1200 b/s
Signal level	Conforms to CCITT V28
Synchronizing method	Start/stop synchronous method
Data bit length	Selection according to 7, 8 bits
Parity	Selection according to none, odd, even
Stop bit length	Selection according to 1, 1.5, 2 bits
Transmission procedure	Non protocol

(2) Data length setting

The data length, parity and stop bit length are carried out by the dip switch mounted on the MD0620B.

	0 0	0 1	1 0
STP	1	1.5	2
PTY	NON	ODD	EVE
CHR	7	8	

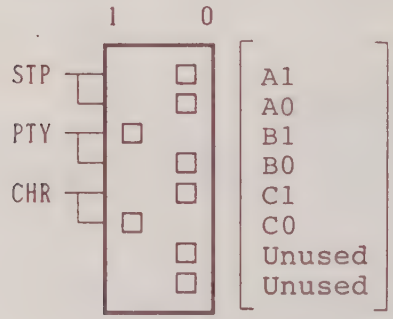


Fig. 1-2 Serial Parameter Switches

Stop bit length				(Bit)
A1	0	0	1	1
A0	0	1	0	1
STP	1	1.5	2	

Parity bit				
B1	0	0	1	1
B0	0	1	0	1
PTY	None	Odd number	Even number	

Character length				(Bit)
C1	0	0	1	1
C0	0	1	0	1
CHR	7	8	7	8

(Setting example)

In Fig. 1-2, the stop bit is set to 1 bit, and even number parity and 8 bit characters.

(3) Signal lines and control lines

Signal name	Pin No.	Description
SD	2	Send data
RD	3	Receive data
RS	4	On at time of data send
CS	5	Send start at ON receive
ER	20	Normally ON
DR	6	Unused

SECTION 2

REMOTE CONTROL

When a measuring device is controlled by a controller program, this is called remote control. However, when the switches on the panel are operated manually, this is called local control. In remote status, the REMOTE lamp on the MD6401A stays lit. Note that local control cannot be carried out as long as this lamp is lit.

The LOCAL and PRINT switches, however, can normally be operated. When the measuring device is being remote-controlled, data that is transferred to the measuring device from the controller is called command. Described in this section is the command composition.

2.1 Commands

(1) Commands are displayed by 2 to 5 character alphabetics (called header).

Many commands are used which have numerics of 1 to 8 digits after them (called parameters).

(Example) IFS1, BS0, ST0, IFA, SA

(2) Many commands are related to the operation of the front panel switches.

(3) Normally, it is necessary to transfer multiple commands so that the measuring device can be set to the desired status. Although the commands can be separately transferred one at a time in this case, they are continuously transferred by separating multiple commands with commas (,).

(Example) ED, PN23, BL5, MB6, SA

However, since the maximum number of characters that can be transferred at once is 80, two transfers will be necessary when the entire length of the commands exceeds 80 characters.

(4) The MD6401A performs settings in the command sequence received.

(5) The remote control commands of the MD6401A are classified into the following three types:

1. Common commands
2. Screen change commands
3. Screen local commands

2.1.1 Common commands

These commands can always be executed and have no relation to the screen that is displayed.

2.1.2 Screen change commands

These commands change the screens. The mode screen can be changed to the master screen, local screen or slave screen to be displayed.

(1) MD command:

Changes to the MODE screen from the optional screen.

(2) BP command:

Executes BACK PAGE operation on the optional screen.

(3) Other screen change commands:

Changes to master screen, local screen or slave screen only.

- o Master screen (Screen returned by BACK PAGE)
- o Local screen (Screen currently displayed)
- o Slave screen (Screen obtainable from local screen)

2.1.3 Screen local commands

These local commands are defined by each screen. When the screen is not displayed, the MD6401A regards it as a command error when these commands are received.

Although the commands have the same names as those of other commands, they are managed as commands by the respective screens. For example, although the SA commands are also in the ERROR/DIST screen and in the WORD TRACE screen, the former refers to measurement start of the error rate, the latter to data send start up of the word generator.

2.2 Remote Command Tables

The remote command table composition is described in Fig. 2-1.

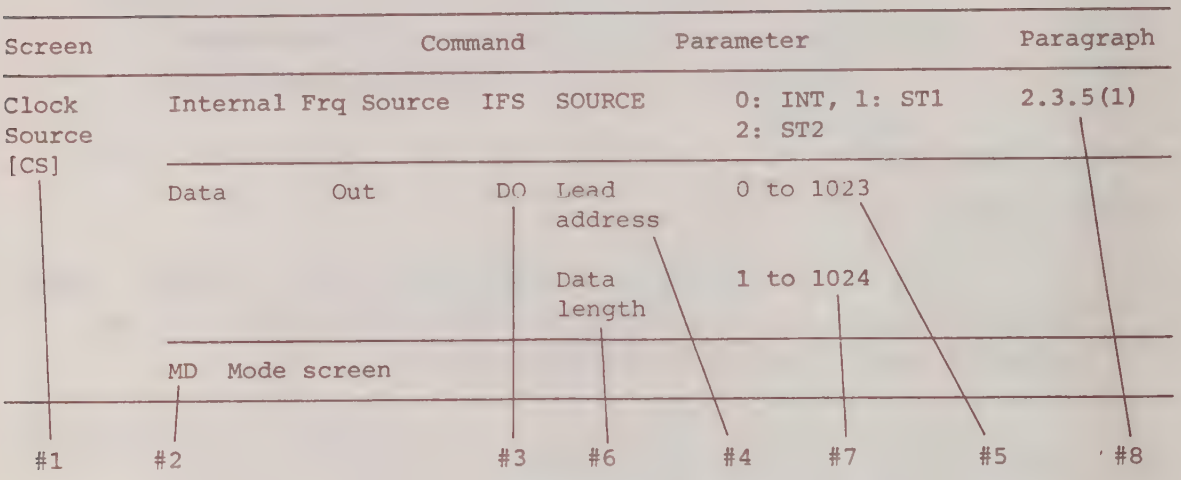


Fig. 2-1 Description of Command

No.	Description
1	Name of screens that can use commands and screen name of change commands of that screen.
2	Name of screen change command that can be changed from that screen. MD: Switch to MODE screen.
3	Local command name. Portion entered in upper case is removed. IFS0: INTERNAL CLOCK SOURCE to SELF. The IFS command can only be used on the CS screen. When using it from other screens, it must be used after the CS screen is used by the CS command, or it must be used as the CSIFS command. CS, IFS0: Switches to CS screen and changes from INTERNAL CLOCK SOURCE to SELF. CSIFS0: Switches to CS screen and to SELF from INTERNAL CLOCK SOURCE.

(Continued)

No.	Description
4	Meaning of 1st parameter
5	Range of 1st parameter
6	Meaning of 2nd parameter
7	Range of 2nd parameter Commands with such multiple parameters are separated by a comma; default parameters are left as they are without being changed. DO 10,100: The DO command is executed with the lead address 10, data length 100.
8	Refer to paragraph 2.3 for a description of the commands and parameters.

2.2.1 - Common commands

Screen	Command	Parameter	Paragraph
Common command	Service ReQuest(SRQ)	SRQ condition: 00000000 to 11111111	2.3.1(1)
	Reset ALarm bit(RAL)	Status alarm bit reset	2.3.1(2)
	OUTput(OUT)	Output device specification: 0 to 3 (2: RPT 2: RMT)	2.3.1(3)

2.2.2 MODE screen command

Screen	Command	Parameter	Paragraph
MoDe [MD]	TiMe set(TM)	Year : 0 to 99 month : 1 to 12 day : 1 to 28..31 hour : 0 to 23 minute: 00 to 59 second: 00 to 59	2.3.2(1)
	Lamp TeSt(LTS)	Lamp test	2.3.2(2)
	Printer TeSt(PTS)	Printer test	2.3.2(3)
	IFA InterFace A (Only when interface unit is mounted) IFB InterFace B (Only when interface unit is mounted) CS Clock Source AL AnaLog (Only when analog unit is mounted)		

2.2.3 CLOCK SOURCE screen command

Screen	Command	Parameter	Paragraph
Clock Source [CS]	Internal Frq Source(IFS)	Frequency source: 0(SELF) to 2(EXT2)	2.3.3(1)
	Byte Sync(BS)	Byte synthesizer: 0(8 k) 1(off)	2.3.3(2)
	External Interface(EI)	External input: 0(TTL) 1(75 Ω)	2.3.3(3)
	BP Back Page (Return to MODE screen) MD MoDe IFA InterFace A IFB InterFace B AL AnaLog (Only when analog unit is mounted)		

2.2.4 INTERFACE screen command

Screen	Command		Parameter	Paragraph
InterFace A [IFA]	Change InterFace(CIF)		Interface: 0(A), 1(B)	2.3.4(1)
	Data Out(DO)		Setting value send	2.3.4(2)
	Monitor lamp SeLect(MSL)		Monitor selection: 0(send), 1(receive), 2(data)	2.3.4(3)
	Send	UniT(SUT)	Unit No.: 1 to 5 Function No.: 0(X20), 1(X21)	2.3.4(4)
		MoDe(SMD)	Mode: 0(ST1) to 4(ST/SP)	2.3.4(5)
		Bit Rate(SBR) b/s	units: 50 to 8192000	2.3.4(6)
		Data Long(SDL)	Character length: 5(5 bit) to 8(8 bit)	2.3.4(7)
		PaRity(SPR)	Parity: 0(NON), 1(ODD), 2(EVEN)	2.3.4(8)
		StoP bit(SSP)	Stop bit length: 0(1 bit) to 2(2 bit)	2.3.4(9)
		Byte Sync(SBS)	Byte synchronize: 0(none) to 1(valid)	
		Er Incert(SEI)	Insertion error: 0(bit) to 1(bit + code)	
		ConTrol(CT)	Send control: 0(ALWYS) to 1(CS-ON)	

INTERFACE screen command

(continued)

Screen	Command		Parameter	Paragraph
Inte-Face A [IFA]	Receive	UniT(RUT)	Unit No.: 0 to 5, 16 Function No. 0(X20), 1(X21)	2.3.4(10)
		MoDe(RMD)	Mode: 1(RT or S) to 5($\overline{RT}$)	2.3.4(11)
		Bit Rate(RBR)	b/s units: 50 to 8192000	2.3.4(6)
		Data Lng(RDL)	Character length: 5(5 bit) to 8(8 bit)	2.3.4(7)
		PaRity(RPR)	Parity: 0(NON), 1(ODD), 2(EVEN)	2.3.4(8)
		Stop bit(RSP)	Stop bit length: 0(1 bit) to 2(2 bit)	2.3.4(9)
	BP Back Page (Return to MODE screen) MD MoDe ED Error / Distortion VF Volt / Frequency DL DeLay WT Word Trace TD Trace Display			
InterFace B [IFB]	Same as the above			

2.2.5 ERROR/DISTORTION screen command

Screen	Command		Parameter		Paragraph
Error/ Distor- tion [ED]	Change InterFace(CIF)		INF changeover: 0(A), 1(B)		2.3.4(1)
	Data Out(DO)		Output of set value and previous measurement results		2.3.4(2)
	Data Out Second(DOS)		Output per second: 0(non) to 2(always)		2.3.5(1)
	Monitor lamp SeLect(MSL)		Monitor selection:	0(send) 1(receive), 2(data)	2.3.4(3)
	Signal ConTrol(SCT)		Line No.: Set status:	0 to 12 0(OFF), 1(ON), 2(OPEN)	2.3.5(2)
	Count	StArt(SA)	Count start		
		StOp(SO)	Count stop		
	Error	stArt(EA)	Cyclic error start		
		stOp(EO)	Cyclic error stop		
		Insert(EI)	Channel error insertion		2.3.5(3)
		Cyclic(EC)	Mantissa: 10(1.0) to 90(9.0)		2.3.5(4)
			Exponent: 1(E1) to 7(E7)		
	Distortion Reset(DR)		Reset of distortion counter		
	BuZzer(BZ)		Buzzer sound	0: off 1: on	

ERROR/DISTORTION screen command

(continued)

Screen	Command		Parameter	Paragraph
Error/ Distor- tion [ED]	Display Select	A(DSA)	Measurement display, left: 0 to 12	2.3.5(5)
		B(DSB)	Measurement display, center: 0 to 12	
		C(DSC)	Measurement display, right: 0 to 12	
	Pattern pRogram	Bin(PR / PRB)	Binary pattern: 00000000 to 11111111	2.3.5(6)
		Dec(PRD)	Decimal pattern: 0 to 255	
		Hex(PRH)	Hexadecimal pattern: 0 to FF	
		psudo Noise(PN)	PN pattern: 6(PN6) to 13(PN23)	
		psd Noise(PNI) Inv	PN inverse: 6(PN6) to 23(PN23)	
		A(PA)	A(0)	
		Z(PZ)	Z(1)	
		Code(PC)	m:n is 0(1:1) to 6(1:7)	
		Voice(PV)	Voice	
		Tone(PT)	1 kHz tone	
	Block Length(BL)		Block length: 0(1E1) to 17(65536)	2.3.5(7)
	Measure Error(ME)		Measured error: 0(bit error) to 1(code error)	2.3.5(8)

ERROR/DISTORTION screen command

(continued)

Screen	Command		Parameter	Paragraph
Error/ Distor- tion [ED]	Measure	Manual(MM)	Manual measurement	2.3.5(9)
		Bit(MB)	Measurement: 4(1E4) to bit length: 9(1E9)	
		Time(MT)	Hour : 0 to 999 Minute: 0 to 59 Second: 0 to 59 ≧00:00:10	
		Repeat Time(MRT)	Hour : 0 to 999 Minute: 0 to 59 Second: 0 to 59 ≧00:00:10	
	BP	Back Page (Return to INTERFACE screen)		
	MD	MoDe		
	IFA	InterFace A		
	IFB	InterFace B		

2.2.6 VOLT/FREQUENCY screen command

Screen	Command		Parameter	Paragraph
Volt/ Frequency [VF]	Change InterFace(CIF)		Interface: 0(A), 1(B)	2.3.4(1)
	Data Out(DO)		Output of measured results	2.3.4(2)
	Monitor lamp SeLect(MSL)		Monitor selection: 0(send), 1(receive), 2(data)	2.3.4(3)
	Signal ConTrol(SCT)		Line No.: 0 to 12 Set status: 0(OFF), 1(ON), 2(OPEN)	2.3.5(1)
	Count	StArt(SA)	Count start	
		StOp(SO)	Count stop	
	Frequency Measure(FM)		Line selection: 0 to 13 (EXT INPUT)	2.3.6(1)
	Volt Measure(VM)		Line selection: 0 to 12	2.3.6(2)
	Gate Time(GT)		Gate time: 0(100 ms) to 3(MANU)	2.3.6(3)
	InTerval(IT)		Hold time: 0(0.5 s) to 3(MANU)	2.3.6(4)
	BP Back Page (Return to INTERFACE screen) MD MoDe IFA InterFace A IFB InterFace B			

2.2.7 DELAY screen

Screen	Command		Parameter	Paragraph
DeLay [DL]	Change InterFace(CIF)		Interface: 0(A), 1(B)	2.3.4(1)
	Data Out(DO)		Measured result output	2.3.4(2)
	Monitor lamp SeLect(MSL)		Monitor selection: 0(send), 1(receive), 2(data)	2.3.4(3)
	Signal ConTrol(SCT)		Line No.: 0 to 12 Set status: 0(OFF), 1(ON), 2(OPEN)	2.3.5(1)
	Count	StArt(SA)	Count start	
		StOp(SO)	Count stop	
		Repeat StArt(RSA)	Repeat measurement start	
	Delay Mode(DM)		Measurement mode: 0(LINE), 1(TRANSMIT)	
	StArt Line(SAL)		Line selection: 0 to 13 (EXT INPUT) On/off: 0(→off/0), 1(→on/1)	2.3.7(1)
	StOp Line(SOL)		Line selection: 0 to 13 (EXT INPUT) On/off: 0(→off/0), 1(→on/1)	
	InTerval(IT)		Hold time: 0(0.5 s) to 3(MANU)	2.3.6(4)
	BP Back Page (Return to INTERFACE screen) MD MoDe IFA InterFace A IFB InterFace B			

2.2.8 TRACE DISPLAY screen command

Screen	Command	Parameter	Paragraph
Trace Display [TD]	CoDe(CD)	Display code: 0(Hexadecimal) to 4(JIS8)	2.3.8(1)
	Display Address(DA)	Lead address: 0 to 32760 (one step)	2.3.8(2)
	Data Out(DO)	Lead address: 0 to 32767 (one step) Data length: 1 to 32768 (one step)	2.3.8(3)
	BP Back Page (Return to INTERFACE screen) MD MoDe IFA InterFace A IFB InterFace B WT Word Trace		

2.2.9 WORD TRACE screen command

Screen	Command		Parameter	Paragraph
Word Trace [WT]	Change InterFace (CIF)		Interface: 0(A), 1(B)	2.3.4(1)
	Data Out(DO)		Measurement result output	2.3.4(2)
	Monitor lamp SeLect(MSL)		Monitor selection: 0(send), 1(receive), 2(data)	2.3.4(3)
	Signal ConTrol(SCT)		Line No.: 0 to 12 Set status: 0(OFF), 1(ON), 2(OPEN)	2.3.5(1)
	Send	stArt(SA)	Send start	
		stOp(SO)	Send stop	
		Stop(SS)	Stop condition: 0(MAN) to 1(1SHORT)	

WORD TRACE screen command

(continued)

Screen	Command	Parameter		Paragraph
Word Trace [WT]	Idling Pattern	Bin(IP, IPB)	Binary pattern: 00000000 to 11111111	2.3.9(1)
		Dec(IPD)	Decimal pattern: 0 to 255	
		Hex(IPH)	Hexadecimal pattern: 0 to FF	
	Word Pattern	Adrs(WPA)	Address: 0 to 8191	2.3.9(2)
		Bin(WP)	Binary pattern: 00000000 to 11111111	
		(WPB)	..... (one or more repetitions)	
			Binary pattern: 00000000 to 11111111	
		Dec(WPD)	Decimal pattern: 0 to 255	
			..... (one or more repetitions)	
			Decimal pattern: 0 to 255	
		Hex(WPH)	Hexadecimal pattern: 0 to FF	
			..... (one or more repetitions)	
			Hexadecimal pattern: 0 to FF	
		Fox(WPF)	FOX pattern	
		Mem(WPM)	Copy from memory board	
	Length	(WL)	Word length: 2 to 8192	
	SYnc Code	X(SYCX)	Non-synchronous	2.3.9(3)
		Bin(SYC, SYCB)	Binary pattern: 00000000 to 11111111	
		Dec(SYCD)	Decimal pattern: 0 to 255	
		Hex(SYCH)	Hexadecimal pattern: 0 to FF	

WORD TRACE screen command

(continued)

Screen	Command			Parameter	Paragraph
Word Trace [WT]	Trace	stArt(TA)		Trace start	
		stOp(TO)		Trace stop	
	Stop	Manual(SM)		Manual stop	2.3.9(4)
		Code	Bin(SC/SCB)	Trigger condition: 0(coincides), 1(does not coincide) Binary pattern: 00000000 to 11111111 Mask bit: 00000000 to 11111111	
			Dec(SCD)	Trigger condition: 0(coincides), 1(does not coincide) Decimal pattern: 0 to 255 Mask bit: 0 to 255	
			Hex(SCH)	Trigger condition: 0(coincides), 1(does not coincide) Hexadecimal pattern: 0 to FF Maxk bit: 0 to FF	
		Line(SL)		Line No.: 0 to 12 On/off: 0(→off/0), 1(→on/1)	
		Byte(SB)		Byte length: 0 to 8000	
		Ext(SE)		LOW/HIGH: 0(→LOW), 1(→HIGH)	
	Stop Delay(SD)			Delay byte number: 0 to 8000	2.3.9(5)
	BP Back Page (Return to INTERFACE screen) MD MoDe IFA InterFace A IFB InterFace B TD Trace Display				

2.3 Description of Commands and Parameters

2.3.1 Common commands

(1) Condition for sending service requests (only when GP-IB is used)

SRQ b1bbbbbb (Initial value: 01100000)

This specifies the conditions for a GP-IB service request. Among the status bytes of the GP-IB, a service request is obtained when there is a change from ON to OFF in bit 1. The D6 bit is disregarded.

Refer to paragraph 2.4.4 for the meaning of each bit of status byte.

(2) Resetting the alarm bit (only when GP-IB is used)

RAL

Resets the alarm bit of the GP-IB status (when bit setting is abnormal).

(3) Specifying the output destination of data

Specifies the output destination.

OUT n

n	Output destination
0	No data output (Initial status)
1	Output on printer
2	Output to remote
3	Output on both printer and remote

2.3.2 MODE screen command

(1) Setting the time

TM 99, 12, 31, 23, 59, 59

Set the year, month, day, hour, minute and second by separating them with commas (,).

(2) Lamp test

LTS

Carry out the lamp test.

(3) Printer test

PTS

Carry out the printer test.

2.3.3 CLOCK SOURCE screen command

(1) Frequency source of internally generated clock

IFS n

n	Frequency sources
0	Self-generation
1	Subordinate to (64 k + 8 k) Hz external input clock
2	Subordinate to 8 kHz external input clock

(2) Byte phase at 64 kb/s

BS n

n	Byte phase
0	Synchronized with 8 kHz of external input
1	Phase free

(3) Interface of external input signal (8 kHz or external clock)

EI n

n	Interfaces
0	TTL
1	75 Ω

2.3.4 INTERFACE screen command

(1) Interface changeover

CIF n

n	Interfaces
0	Interface A
1	Interface B

(2) Request for data send

DO

Information on the set value is sent to the area determined by the OUT command. Refer to Section 3 for the data content and format.

(3) Monitor lamp display content

MSL n

n	Displays contents
0	Displays send unit status
1	Displays receive unit status
2	Displays receive data in 8-bit parallel

(4) Receive unit

SUT n, m

n: Unit number insertion position

m: Function number when unit is X20/21
(0: X20; 1: X21)

(5) Send mode

SMD n

n	V24	V35	V36	X20	X21	TTL
0	ST1	ST1	ST1	——	ST1	ST1
1	ST2	ST2	ST2	——	S	ST2
2	$\overline{ST2}$	$\overline{ST2}$	$\overline{ST2}$	——	$\overline{S}$	$\overline{ST2}$
3	ASYNC	——	——	ASYNC	ST2	ASYNC
4	ST/SP	——	——	ST/SP	$\overline{ST2}$	ST/SP

(6) Sending speed

SBR n

n: b/s units (50 to 8192000)

(7) Character length (at ST/SP)

SDL n

n: Character length (Does not include 5 bit to 8 bit, parity.)

(8) Parity (at ST/SP)

SPR n

n	Parity
0	No parity
1	Odd number parity
2	Even number parity

(9) Stop bit length (at ST/SP)

SSP n

n	Stop bit length
0	1 bit
1	1.5 bit
2	2 bit

(10) Receive unit

RUT n, m

n: Unit number insertion position (0: send and same unit; 16: SELF LOOP)

m: Function number when unit is X20/21 (0: X20; 1: X21)

(11) Receive mode

RMD n

n	V24	V35	V36	X20	X21	TTL
0	——	——	——	——	——	——
1	RT	RT	RT	——	S	RT
2	$\overline{RT}$	$\overline{RT}$	$\overline{RT}$	——	$\overline{S}$	$\overline{RT}$
3	ST	ST	ST	ASYNC	RT	ASYNC
4	ASYNC	——	——	ST/SP	$\overline{RT}$	ST/SP
5	ST/SP	——	——	——	ST	——

2.3.5 ERROR/DISTORTION screen command

(1) Data send conditions per second

DOS n

Data is sent at 1 second intervals during error measurement under the following conditions. In addition, this command does not have any effect on printer output.

n	Data sending conditions per second
0	Not sent
1	Sent only when error is detected
2	Normally sent every second

(2) Sending the control signal

SCT n, m

n: Signal line number (see Table below)

m: Set contents of signal line
(0: OFF 1: ON 2: OPEN)

n	V24	V35	V36	X20	X21	64K	TTL
0	(SD)	(SD)	(SD)	(T)	(T)	(SD)	(SD)
1	(RD)	(RD)	(RD)	(R)	(R)	(RD)	(RD)
2	(ST1)	(ST1)	(ST1)	——	C	(CLK)	(ST1)
3	(ST2)	(ST2)	(ST2)	——	(I)	——	(ST2)
4	(RT)	(RT)	(RT)	——	(S)	AIS	(RT)
5	ER	ER	ER	——	(B)	——	——
6	(DR)	(DR)	(DR)	——	——	(IAL)	——
7	RS	RS	RS	——	——	——	——
8	(CS)	(CS)	(CS)	——	——	——	——
9	(CD)	(CD)	(CD)	——	——	——	——
10	(CI)	(CI)	(CI)	——	——	——	——
11	(TI)	(TI)	(TI)	——	——	——	——
12	NS	——	NS	——	——	——	——

(3) Channel error insertion

EI

With this command, errors per reception are inserted in 1 bit.

(4) Error rate of cyclic errors

EC n, m

n	10	11	13	15	17	20	25
Mantissa	1.0	1.1	1.3	1.5	1.7	2.0	2.5

n	30	40	50	60	70	80	90
Mantissa	3.0	4.0	5.0	6.0	7.0	8.0	9.0

m	1	2	3	4	5	6	7
Exponent	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}

(5) Displaying contents of measured results

DSA n, DSB n, DSC n

DSA, DSB, DSC: Display position

n: Display contents

Command	DSA	DSB	DSC
Display position	Left column	Center	Right column

n	0	1	2	3	4	5
Display position	ERROR	ERROR RATE	BLOCK ERROR	BLOCK ERR RATE	ES	%ES

n	6	7	8	9	10
Display position	DM	%DM	SES	%SES	+ column Point distortion

n	11	12
Display position	- column Point distortion	Bias distortion

(6) Measurement patterns

(a) Programmable patterns

PR b, PRB b, PRD d, PRH h

8-bit patterns are set by the following three methods:

- o Binary pattern b: 00000000 to 11111111
- o Decimal number d: 0 to 255 (Example 10 = 00001010)
- o Hexadecimal number h: 0 to FF (Example 5B = 01011011)

(b) Pseudo random patterns

PN n, PNI n

n: Cycle of pseudorandom pattern (2^n - 1 bit cycle)

PNI command: PN pattern of 1/0 inversion

(Unit: bits)

n	6	7	9	11
Pattern cycle	63	127	511	2,047

n	15	19	20	23
Pattern cycle	32,767	524,287	1,048,575	8,388,607

(c) Code types

PA, PZ, PC n

PA: A code pattern (All 0)

PZ: Z code pattern (All 1)

PC n: (a:b) pattern (a: 1 b: 0)

n	0	1	2	3	4	5	6
a:b pattern	1:1	3:1	1:3	4:1	1:4	7:1	1:7

(d) Other patterns

PV, PT

PV: Voice is changed to a digital signal of 64 kb/s and sent.

PT: Sine wave of 1 kHz is converted to digital signal of 64 kb/s and sent.

(7) Block length

BL n

(Unit: bits)

n	0	1	2	3	4	5
Block length	10	100	1000	10000	100000	1000000

n	6	7	8	9	10	11
Block length	32	64	128	256	512	1024

n	12	13	14	15	16	17
Block length	2048	4096	8192	16384	32768	65536

(8) Measurement error

ME n

n: Types of error (0: bit error 1: code error)

(9) Measurement time

(a) Manual measurement

MM

(b) Bit length measurement

MB n

(Unit: bits)

n	4	5	6	7	8	9
Bit length	10^4	10^5	10^6	10^7	10^8	10^9

(c) Time length measurement

MT hhh, mm, ss

hhh: time
mm: minute
ss: second

(d) Repeat of time length measurement

MRT hhh, mm, ss

2.3.6 VOLT/FREQUENCY screen command

(1) Selection of frequency measurement line

FM n

n: Signal line number (see Table below)

n	V24	V35	V36	X20	X21	64K	TTL
0	SD	SD	SD	T	T	SD	SD
1	RD	RD	RD	R	R	RD	RD
2	ST1	ST1	ST1	——	C	CLK	ST1
3	ST2	ST2	ST2	——	I	——	ST2
4	RT	RT	RT	——	S	AIS	RT
5	ER	ER	ER	——	B	——	——
6	DR	DR	DR	——	——	IAL	——
7	RS	RS	RS	——	——	——	——
8	CS	CS	CS	——	——	——	——
9	CD	CD	CD	——	——	——	——
10	CI	CI	CI	——	——	——	——
11	TI	TI	TI	——	——	——	——
12	NS	——	NS	——	——	——	——
13	External input	External input	External input	External input	External input	External input	External input

(2) Selection of voltage measurement line

VM n

n: Signal line number (the same as FM command, but external input is none)

(3) Gate time of frequency measurement

GT n

(Unit: sec)

n	0	1	2	3
Gate time	0.1	1.0	10.0	Manual

(4) Hold time of frequency measurement

IT n

(Unit: sec)

n	0	1	2	3
Hold time	0.5	1.0	5.0	Manual

2.3.7 DELAY screen command

(1) Selection of count start/stop signal of line interval measurement

SAL n, m
SOL n, m

n: Signal line number; Same as paragraph 2.3.6(1)

m: Set contents of signal line (0:ON→OFF/1→0)
(1:ON→OFF/0→1)

2.3.8 TRACE DISPLAY screen command

(1) Display code

CD n

n	0	1	2	3	4
Display	HEX	ASCII	EBCDIC	EBCDIK	JIS 8

(2) Lead address of display data

DA n

n: Lead address (0 to 32767)

(3) Trace data output request

DO n, m

n: Lead address (0 to 32767)
m: Output data number (1 to 32768; sent in 10 byte units)

2.3.9 WORD TRACE screen command

(1) Idling pattern

IR b, IPB b, IPD d, IPH h

There are three ways to set an 8-bit pattern:

- o Binary pattern b: 00000000 to 11111111
- o Decimal number d: 0 to 255 (Example 10 = 00001010)
- o Hexadecimal number h: 0 to FF (Example 5B = 01011011)

(2) Word patterns

This command sets the send data used for word generation.

(a) Specify the addresses of data to be set as follows:

WPA n

n: Address (0 to 8191)

(b) Word pattern

WP b, b --- b, WPB b, b --- b
WPD d, d --- d, WPH h, h --- h

This command sets the send data used for word generation. There are three ways to set the word patterns:

- o Binary pattern — b: 00000000 to 11111111
- o Decimal number — d: 0 to 255 (Example 10 = 00001010)
- o Hexadecimal number — h: 0 to FF (Example 5B = 01011011)

Patterns can be separated by commas (,) and continuously set. In this case the address is incremented each time 1 data is set.

(Example) From address 10, send data is read in 16 bytes.

```
WPA 10
WPH 41, 42, 43, 44, 45, 46, 47, 48
WPH 49, 4A, 4B, 4C, 4D, 4E, 4F, 50
```

(c) FOX pattern

WPF

The FOX pattern that conforms to CCITT is set.

(d) Memory unit pattern

WPM

The memory unit pattern is copied and taken as the word pattern.

(3) Synchronous pattern

This command sets the synchronous pattern for tracing.

(a) No synchronous pattern (when byte synchronize is not necessary)

SYCX

n: Address (0 to 8191)

(b) Synchronous pattern

SYC b, SYCB b, SYCD d, SYCH h

There are three ways set the synchronous pattern:

- o Binary pattern — b: 00000000 to 11111111
- o Decimal number — d: 0 to 255 (Example 10 = 00001010)
- o Hexadecimal number — h: 0 to FF (Example 5B = 01011011)

(4) Trace stop trigger

This command specifies the trigger conditions for trace stop during pattern tracing.

(a) Manual stop

SM

Tracing is carried out until it is manually stopped.

(b) Code stop

SC a, b1, b2, SCB a, b1, b2
SCD a, d1, d2, SCH a, h1, h2

a: Coincides, does not coincide (0: stops when specified code is detected; 1: stops when code other than that specified is detected.)

b1, d1, h1: Specified code

b2, d2, h2: Mask code

Bit 1 becomes a "don't care bit" with regards to a mask code during specification. When the mask code is omitted by omission enable, it becomes 00000000.

There are three ways to set a specified code and mask code:

- o Binary pattern b: 00000000 to 11111111
- o Decimal number d: 0 to 255 (Example 10 = 00001010)
- o Hexadecimal number h: 0 to FF (Example 5B = 01011011)

(c) On/off stop of signal line

SL n, m

n: Refer to paragraph 2.3.7(1), signal line No.; n is 0 to 12.

m: Refer to paragraph 2.3.7(1), conversion direction of the signal line; n is 0 to 12

(d) Trace byte number stop

SB n

n: Trace byte number (n: 0 to 8000)

(e) External input signal on/off stop

SE m

m: Conversion direction of external input signal (0: HIGH → LOW 1: LOW → HIGH)

(5) Delay trace byte number following trace stop trigger detection

SD n

n: Delay byte number (n: 0 to 8000)

This command is invalid in the case of manual stop and trace byte number stop.

2.4 GP-IB Characteristic Commands

2.4.1 Device clear

The measuring device is initially set before shipment from the factory.

For the initial status, refer to the description of each screen (clock is not cleared).

2.4.2 Device trigger

If an SA command is in the currently displayed screen, operation is the same.

In the absence of an SA command, this can be disregarded.

2.4.3 Local

Releases the panel remote status.

2.4.4 Status byte

The meaning of each bit of status byte is defined below.

D7	D6	D5	D4	D3	D2	D1	D0
X	SRQ	ALARM	MES	DATA	X	X	PEND

Status byte

SRQ: Service request
ALARM: Abnormal setting
MES: Measurement in progress
DATA: Data to be sent
PEND: End of printer paper
X: Unused

Once an alarm occurs with regards to an abnormal bit setting, this status is held until the device is cleared or the alarm reset command (RAL) is reset.

Each bit of D0, D3, D4 and D5 can be set depending on whether the respective statuses are service-requested when they are generated.

SECTION 3

OUTPUT FORMAT

3.1 CLOCK SOURCE Screen

The format given below is sent when the DO command is received.

Data No.	Output contents	Range	Remarks
1	Screen symbol	Fixed	Always CS
2	Data classification	Fixed	Always 0
3 to 5	Date: year, month, day	00,1,1 to 99,12,31	
6 to 8	Time: hour, min, sec	0,00,00 to 23,59,59	
9	INTERNAL FRQ SOURCE	0(SELF) to 2(EXT2)	
10	BYTE SYNC	0: 8 k 1: off	
11	EXTERNAL INTERFACE	0: TTL 1: 75 Ω	
12	Unused	Fixed	Always 99
13	Unused	Fixed	Always 99
14	Unused	Fixed	Always 9999999
15	Unused	Fixed	Always 99
16 to 18	Unused	Fixed	Always 99999

```
  ①②   ③    ④    ⑤    ⑥    ⑦    ⑧
CS0, 86,  9,  9, 15, 00, 05,
----------------------------
1     5     10    15    20 22

  ⑨   ⑩   ⑪   ⑫   ⑬    ⑭
  0,  1,  1, 99, 99, 9999999,
-------------------------------
23 25    30    35    40    45

  ⑮    ⑯     ⑰     ⑱
99, 99999, 99999, 99999
-----------------------
46    50    55    60    65
```

CLOCK SOURCE Screen Output Format

3.2 INTERFACE Screen

The format given below is sent when the DO command is received.

Data No.	Output contents		Range	Remarks
1	Screen symbol		Fixed	Always IF
2	Data classification		Fixed	Always 0
3 to 5	Date: year, month, day		00,1,1 to 99,12,31	
6 to 8	Time: hour, min, sec		0,00,00 to 23,59,59	
9	Send	UNIT	1 to 5	Slot No.
10			0: X20, 1: X21	Others: 99
11		BIT RATE	50 to 8192000	Unit: bit/s
12		MODE	0(ST1) to 4(ST/SP)	
13 to 15		Unused	Fixed	Always 99
16		DATA LNGTH	5 to 8	Only when MODE = ST/SP In other cases, it is packed by 9.
17		PARITY	0: none to 2: even	
18		STOP BIT	0: 1, 1: 1.5, 2: 2	
19 to 24		Unused	Fixed	Always 99
25	Receive	UNIT	1 to 5, 16(LOOP)	Slot No.
26			0: X20 1: X21	Others: 99
27		BIT RATE	50 to 8192000	Unit: bit/s
28		MODE	1(RT) to 5(ST/SP)	
28 to \		Unused	Fixed	Always 99
_		DATA LNGTH	5 to 8	Only when TIMING = ST/SP. In other cases, it is packed by 9.
_		PARITY	0: none to 2: even	
34		STOP BIT	0: 1, 1: 1.5, 2: 2	
35 to 40		Unused	Fixed	Always 99

```
 ①②  ③   ④   ⑤   ⑥   ⑦   ⑧
IF0, 86, 9, 9, 15, 00, 05,
----------------------------
1     5     10    15    20 22

 ⑨  ⑩    ⑪      ⑫  ⑬  ⑭  ⑮
 3, 99, 1234567, 1, 99, 99, 99,
-------------------------------
23 25    30     35    40    45 48

 ⑯  ⑰  ⑱  ⑲  ⑳  ㉑  ㉒  ㉓  ㉔
99, 99, 99, 99, 99, 99, 99, 99, 99,
-----------------------------------
4950    55    60    65    70    75

 ㉕  ㉖    ㉗      ㉘  ㉙  ㉚  \
 4, 99, 2345678, 1, 99, 99, 99,
-------------------------------
76   80    85    90    95   100101

 —      34 35 36 37 38 39 40
99, 99, 99, 99, 99, 99, 99, 99, 99
-----------------------------------
102 105   110   115   120   125 127
```

INTERFACE Screen Output Format

3.3 ERROR/DISTORTION Screen

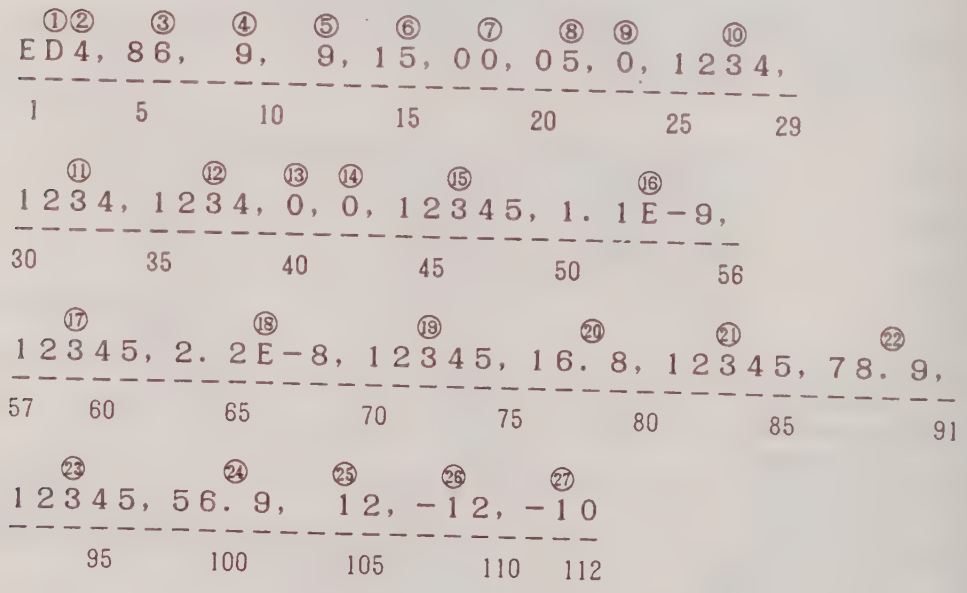
The DO command is sent by the format given below when it is received.

Data No.	Output contents		Range	Remarks
1	Screen symbol		Fixed	Always ED
2	Data classification		0 to 5	0: Data during count stop 1: Count start data 2: 1 sec data 3: Data being counted 4: Cycle complete data 5: Count stop data
3 to 5	Date: year, month, day		00,1,1 to 99,12,31	
6 to 8	Time: hour, min, sec		0,00,00 to 23,59,59	
9	Monitor lamps	Monitor type	0 to 2	0: send 1: receive/send 2: data
10		Current status	0 to 8191	Lamps 0, 1, 2, ... to 12 MSB LSB
11		Send/receive	0 to 8191	
12		Send	0 to 8191	Underfined lamps are 0.
13	SYNC OUT		0 to 1	0: no 1: yes
14	OVERFLOW		0 to 1	
15	BIT ERROR		0 to 99999	Fields not measured are packed by 9.
16	BIT ERR RATE		0.0E-0 to 9.9E-1	
17	BLOCK ERROR		0 to 99999	
18	BLOCK ERR RATE		0.0E-0 to 9.9E-1	
19	ES		0 to 99999	
20	%ES		0.0 to 100	

ERROR/DISTORTION Screen

(Continued)

Data No.	Output contents	Range	Remarks
21	DM	0 to 99999	Fields not measured are packed by 9.
22	%DM	0.0 to 100	
23	SES	0 to 99999	
24	%SES	0.0 to 100	
25	INDV/+	0 to 49	
26	INDV/-	-49 to 0	
27	BIAS	-49 to 49	



ERROR/DISTORTION Screen Output Format

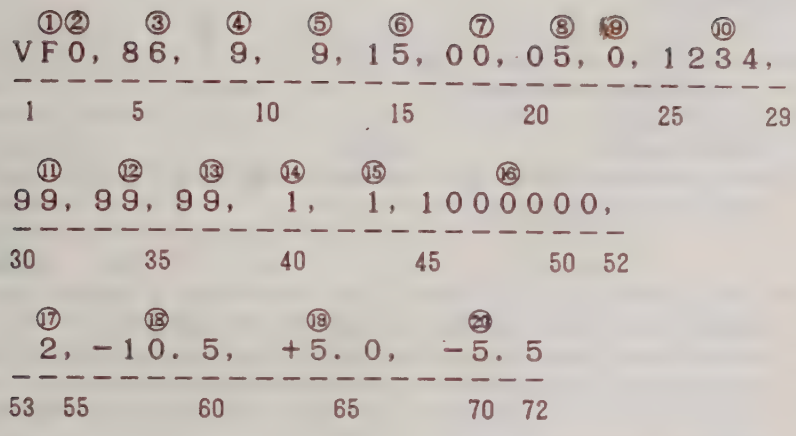
o Monitor lamps (11) and (12)

Data classification	(11) Receive or send/receive (12) Send
0: Data during count stop	Monitor lamp status when counting previous measurement is stopped
1: Count start data	Monitor lamp status at time of count start
2: 1 sec data	No data (9999 is sent)
3: Data during counting	Monitor lamp status at time of data send
4: Cycle complete data	Monitor lamp status at time of cycle complete
5: Count stop data	Monitor lamp status at time of count stop

3.4 VOLT/FREQUENCY Screen

The DO command is sent in the following format at time of receive.

Data No.	Output contents		Range	Remarks
1	Screen symbol		Fixed	Always ED
2	Data classification		Fixed	Always 0
3 to 5	Date: year, month, day		00,1,1 to 99,12,31	
6 to 8	Time: hour, min, sec		0,00,00 to 23,59,59	
9	Monitor lamps	Monitor type	0 to 2	0: send 1: receive/send 2: data
10		Current status	0 to 8191	Lamps 0, 1, 2, ... to 12 MSB LSB Underfined lamps are 0.
11 to 13	Unused		Fixed	Always 99
14	GATE TIME		0(100 ms) to 3(MAN)	
15	FREQUENCY LINE		0 to 13(EXT)	
16	FREQUENCY COUNT		0 to 1000000	BEMAC counter is live.
17	VOLT LINE		0 to 12	
18	VOLT DATA		-30.0 to 30.0	Voltage when balanced (A-B)
19	VOLT DATA (A)		-30.0 to 30.0	Send only when balanced. Other cases: send 99999
20	VOLT DATA (B)		-30.0 to 30.0	

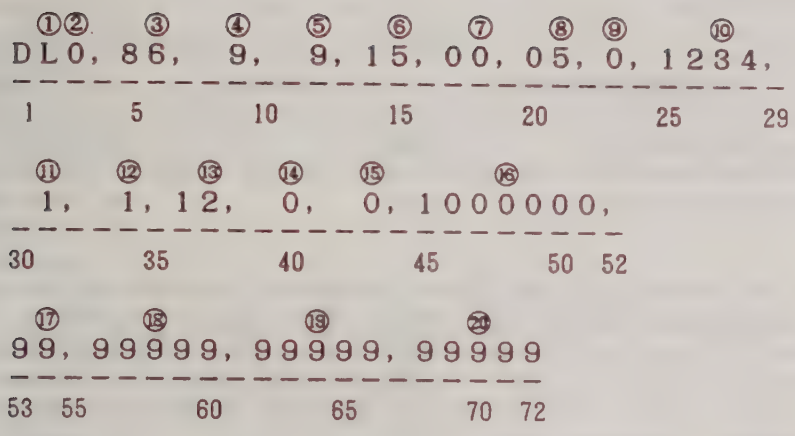


VOLT/FREQUENCY Screen Output Format

3.5 DELAY Screen

The DO command is sent in the following format at time of receive.

Data No.	Output contents		Range	Remarks
1	Screen symbol		Fixed	Always DL
2	Data classification		0 to 1	0: LINE INTERNAL 1: TRANSMISSION DELAY
3 to 5	Date: year, month, day		00,1,1 to 99,12,31	
6 to 8	Time: hour, min, sec		0,00,00 to 23,59,59	
9	Monitor lamps	Monitor type	0 to 2	0: send 1: receive/send 2: data
10		Current status	to 8191	Lamps 0, 1, 2, ... to 12 MSB LSB Underfined lamps are 0.
11	START	LINE	0 to 13(EXT)	Packed by 9 at TRANSMISSION DELAY
12		EVENT	0: →0, OFF, LOW 1: →1, ON, HIGH	
13	STOP	LINE	0 to 13(EXT)	
14		EVENT	0: →0, OFF, LOW 1: →1, ON, HIGH	
15	COUNT STATUS		0 to 3	0: NORMAL END 1: WAIT START 2: WAIT STOP 3: OVERFLOW
16	DELAY		0 to 1000000	Unit: 0.01 ms
17	Unused		Fixed	Always 99
18 to 20	Unused		Fixed	Always 99999



DELAY Screen Output Format

3.6 WORD TRACE Screen (1)

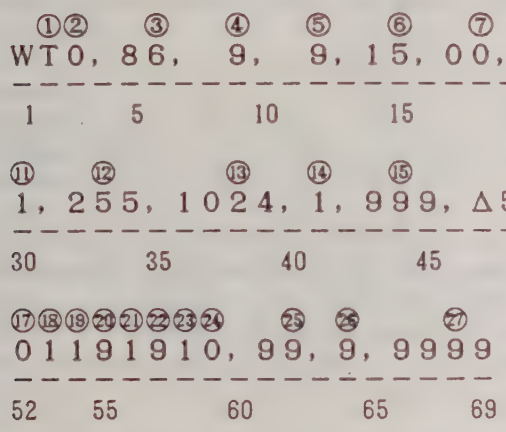
The DO command is sent in the following format at time of receive.

Data No.	Output contents		Range	Remarks	
1	Screen symbol		Fixed	Always WT	
2	Data classification		Fixed	0: Set value data 1: Data at time of trace complete	
3 to 5	Date: year, month, day		00,1,1 to 99,12,31	#2 is; 0: Current time 1: Trace stop time	
6 to 8	Time: hour, min, sec		0,00,00 to 23,59,59		
9	Monitor lamps	Monitor type	0 to 2	0: send 1: receive/send 2: data	
10		Current status	0 to 8191	Lamps 0, 1, 2, ... to 12 MSB LSB Underfined lamps are 0.	
11	SEND METHOD		0(MAN) to 1(1 SHOT)		Set value data
12	IDLE PATTERN		0 to 255		
13	WORD LENGTH		2 to 8192		
14	TRACE STOP		0(MAN) to 5(EXT)		
15	SYNC CODE		0 to 255	999 doesn't matter	
16	STOP DELAY		0 to 8000		
17 to 24	STOP CODE		0 to 1	9 doesn't matter	
25	STOP	LINE	0 to 13(EXT)		
26		EVENT	0 to 1		
27	TRACE BYTE		0 to 8000		

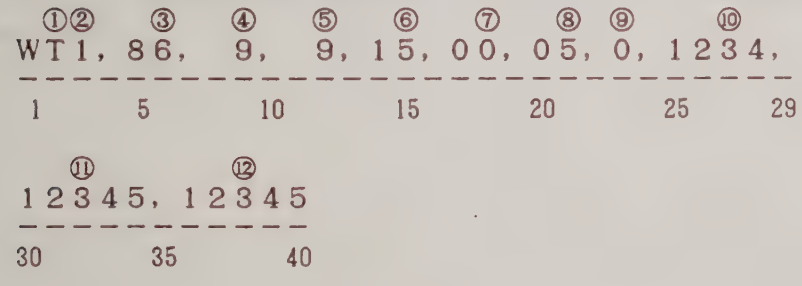
WORD TRACE Screen

(Continued)

Data No.	Output contents	Range	Remarks
11	Trigger detection address	0 to 32767	Data at time of trace complete
12	Trace stop address	0 to 32767	



WORD TRACE Screen Output Format (set value data)

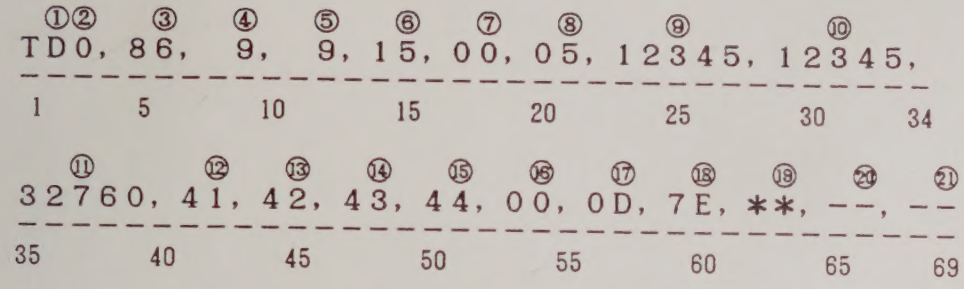


WORD TRACE Screen Output Format (data at time of trace complete)

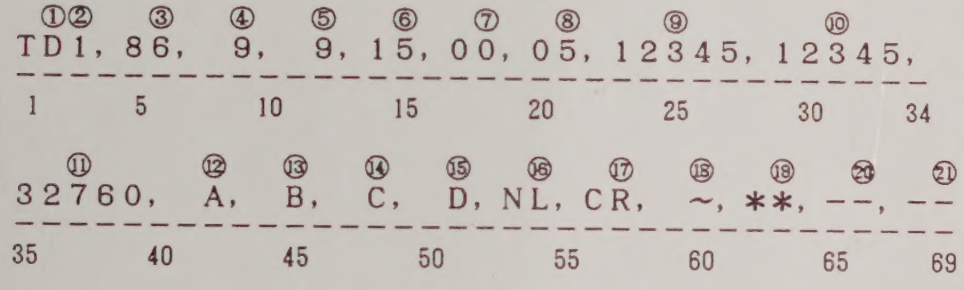
3.7 TRACE DISPLAY Screen

The display starts from the address of a multiple of 10 and data of a 10-byte portion is sent on one line. (The 1st digit of the DO command parameter and the lead address are truncated and the byte number are raised.) If they cannot fit on one line, they are sent on multiple lines by the same format.

Data No.	Output contents	Range	Remarks
1	Screen symbol	Fixed	Always TD
2	Data classification	0 to 4	0: Hexadecimal 1: ASCII 2: EBCDIC 3: EBCDIK 4: JIS 8
3 to 5	Date year, month, day	00, 1, 1 to 99,12,31	Trace stop time
6 to 8	Time hour, min, sec	0,00,00 to 23,59,59	
9	Trigger detection address	0 to 32767	
10	Trace stop address	0 to 32767	
11	Lead address	0 to 32760	
12 to 21	Data	Same as in printing	



TRACE DISP Screen Output Format (for hexadecimal display)



TRACE DISP Screen Output Format (for ASCII display)

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